

REMARKS

Claims 1-10, 12-35, and 37-47 are pending, with claims 1, 18, and 30 being independent and claims 16-29 being withdrawn.

Claim Rejections – 35 U.S.C. §112

The claims have been rejected for lacking blank spaces and for containing "!" throughout. The claims that were submitted on June 4, 2007 were converted into pdf format using a program that was not compatible with electronic filing using EFS. Accordingly, applicant attaches to this reply a clean copy of the claims that were submitted on June 4, 2007. Applicant can submit a copy showing the changes made if the Examiner requires such a copy.

Applicant requests withdrawal of this rejection.

Claim Rejections – 35 U.S.C. §103

Claims 1-10, 12-15, 30-35, and 37-47 have been rejected as being unpatentable over U.S. Patent No. 6,791,057 (Kratzsch) in view of U.S. Patent No. 4,381,148 (Ulrich) or as being unpatentable over EP 0 674 965 (Bethke) in view of Ulrich. Applicant requests withdrawal of this rejection for the following reasons.

Independent claim 1 recites a laser-processing machine including a laser that produces laser radiation at a wavelength λ directed to a workpiece, a means for decoupling diagnostic radiation from the laser radiation that is directed to the workpiece, a measuring cell, and a sound detector. The laser is associated with one or more operating gases, where the one or more operating gases include one or more gases of the gas atmosphere through which the laser is guided, one or more laser-processing machine gases that are used on the workpiece, and one or more supply gases for the laser. The means for decoupling diagnostic radiation is positioned downstream of the laser and in the path of the laser radiation that is directed to the workpiece to decouple a part of the laser radiation from the laser. A portion of the one or more operating gases to be analyzed can flow into the measuring cell, the measuring cell being positioned downstream of the means for decoupling diagnostic radiation to receive the decoupled diagnostic

radiation. The sound detector detects a photo-acoustical effect due to absorption of the diagnostic radiation at the wavelength λ by the portion of the operating gases in the cell.

Applicant requests withdrawal of the rejection of claims 1-10, 12-15, and 38-42 because neither Kratzsch, Ulrich, Bethke, nor any proper combination of the three describes or suggests a means for decoupling diagnostic radiation from laser radiation that is directed to a workpiece and a measuring cell into which a portion of one or more operating gases to be analyzed can flow, the measuring cell being positioned downstream of the means for decoupling diagnostic radiation to receive the decoupled diagnostic radiation, as recited in independent claim 1.

Kratzsch relates to a laser processing system in which laser radiation 1 is directed through optics to a workpiece 20, where the laser radiation is either reflected off a dichroic mirror 7 (Fig. 2) or by passage through a dichroic mirror 8 (Fig. 3) of the optics. See Kratzsch at col. 6, line 41 to col. 7, line 24 and Figs. 2 and 3. The workpiece 20 is heated from the laser radiation 1 and this heating produces thermal radiation (designed by the dashed lines in Figs. 2 and 3) that is directed back into the optics and to an optical system 12 and a detector 11, where it can be analyzed. See Kratzsch at col. 6, line 58 to col. 7, line 23 and Figs. 1-3.

However, Kratzsch does not describe or suggest a means for decoupling radiation from the laser radiation 1 that is directed to the workpiece 20, where the decoupling means is positioned downstream of the laser to decouple a part of the laser radiation 1 from the laser. The laser radiation 1 that is directed to the workpiece 20 is not decoupled. Rather, the laser radiation 1 that is directed to the workpiece 20 passes to the workpiece 20 effectively untouched by entirely reflecting at the dichroic mirror 7 or by entirely passing through the dichroic mirror 8. The radiation that is sent to the detector 11 to be analyzed is not radiation that is decoupled from the laser radiation 1; rather, it is radiation that is produced from the heat at the workpiece 20. Moreover, as the Examiner realizes, Kratzsch lacks a measuring cell.

Realizing these deficiencies, the Examiner first cites Ulrich, arguing that Ulrich describes "a power meter cell." While the Examiner is correct that Ulrich places a cell that houses a laser radiation-absorbing gas in a flow path of a laser beam, Ulrich never describes or suggests that such a cell is placed downstream of a means for decoupling diagnostic radiation, or that such a

cell includes operating gases, as recited in claim 1. Rather, as Ulrich explains, the power meter cell is placed into the direct beam of the laser radiation, and is filled with a gas that is not an operating gas. See Ulrich at abstract. Indeed, Ulrich explicitly teaches away from the use of a decoupling means or a cell that includes operating gases because Ulrich's cell is set up to allow the beam to pass through the cell "essentially unaltered" and the concentration of the gas is modulated to give an absolute measurement of the power in the laser beam. See Ulrich at abstract.

Ulrich also lacks a decoupling means since in Ulrich, all light from the laser source is directed through a cell 17 (thus, none of it can be considered to be decoupled from radiation that is directed to a workpiece). And, while Ulrich mentions a cell 17, Ulrich never describes or suggests that the cell 17 is placed downstream of the decoupling means or that the cell 17 includes operating gases.

Moreover, Bethke suffers from the same deficiencies as Kratzsch. In Bethke, the laser beam 10 is reflected at the partially transmitting deflecting mirror 12 and directed to a surface 2 of a workpiece 1. Light that is produced at the workpiece 1 is directed back and through the mirror 12 to a photodiode 17. Thus, only the reflected light from the workpiece 1 is directed to the photodiode 17, and none of the laser beam 10 that is directed to the workpiece 1 is decoupled using the mirror 12 (indeed, the mirror reflects all of the laser beam 10). Moreover, Bethke also lacks a measuring cell.

Accordingly, for at least these reasons, claim 1 is allowable over any proper combination of Kratzsch, Ulrich, and Bethke. Claims 2-10, 12-15, and 38-42 depend from claim 1, and are allowable for at least the reasons that claim 1 is allowable, and for containing allowable subject matter in their own right. For example, claim 9 recites that the laser-processing machine includes a control unit for using a rinsing gas in response to the photo-acoustical effect measured. None of the cited references describes or suggests such a control unit. As a further example, claim 10 recites that the control unit is formed for controlling the flow rate of one or more supply gases of the laser-processing machine and of working or cutting gases in response to the analysis of a gas atmosphere in feed lines or in a laser beam path. None of the cited

references describes or suggests such control. As another example, claim 38 recites that the laser-processing machine also includes a means for directing the portion of the laser-processing machine gas in the cell to flow back to the laser after it has been analyzed. None of the references describes or suggests such a directing means.

Independent claim 30 recites a diagnostic machine including a radiation decoupler positioned downstream of a laser and in the path of laser radiation of wavelength λ that is directed to a workpiece such that at least a portion of the radiation is decoupled from the path of the laser radiation at the radiation decoupler and the decoupled radiation is directed along a new path. The diagnostic machine also includes a measuring cell into which operating gas to be analyzed flows, and a sound detector positioned relative to the measuring cell. The measuring cell is positioned downstream of the radiation decoupler to receive the decoupled radiation and includes an inlet that receives the operating gas to be analyzed from one or more of gases of the gas atmosphere through which the laser is guided, laser-processing machine gases that are used on the workpiece, and supply gases for the laser. The sound detector is configured to detect a photo-acoustical effect due to absorption of the decoupled radiation at wavelength λ by gas in the measuring cell.

Applicant requests withdrawal of the rejection of claims 30-35, 37, and 43-47 because, as discussed above with respect to claim 1, neither Kratzsch, Ulrich, Bethke, nor any proper combination of the three describes or suggests a radiation decoupler positioned downstream of a laser and in the path of laser radiation that is directed to a workpiece such that at least a portion of the radiation is decoupled from the path of the laser radiation at the radiation decoupler, and a measuring cell into which operating gas to be analyzed flows, the measuring cell being positioned downstream of the radiation decoupler and including an inlet that receives the operating gas to be analyzed, as recited in independent claim 30. Accordingly, claim 30 is allowable over any proper combination of Kratzsch, Ulrich, and Bethke.

Claims 31-35, 37, and 43-47 depend from claim 30, and are allowable for at least the reason that claim 30 is allowable, and for containing allowable subject matter in their own right. For example, claim 35 recites that the diagnostic machine also includes a control unit for using a

rinsing gas in response to the photo-acoustical effect measured. None of the cited references describes or suggests such a control unit. As another example, claim 43 recites that the operating gas to be analyzed is a laser operating gas. None of the cited references describes or suggests that a laser operating gas be analyzed.

Conclusion

In conclusion, applicant submits that all claims are in condition for allowance. The fee for \$460.00 for the Two Month Extension of Time to and including January 10, 2008 is being paid concurrently with the Electronic Filing System (EFS). Please apply all charges or credits to deposit account 06-1050, referencing Attorney Docket No. 15540-009001.

Respectfully submitted,

Date: January 10, 2008

/Diana DiBerardino/

Diana DiBerardino
Reg. No. 45,653

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331